

Observations of [O I] 6300Å Emission from Io's Atmosphere

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In 1990 we began a program of observations of [O I] 6300Å emission from Io's vicinity, using the stellar echelle spectrograph at the McMath-Pierce telescope on Kitt Peak. Spectra of Io have been obtained at a typical spectral resolving power of $\sim 1.2 \times 10^5$. The viewing aperture was $5''.2 \times 5''.2$, centered on Io, and the integration time for a spectrum was usually 10–15 minutes. We have acquired about 250 raw spectra since 1990, and the data are being reduced and analyzed. Preliminary results from the early observations were presented by Scherb and Smyth [*JGR* **98**, 18729 (1993)]. The [O I] 6300Å emission from Io may be produced in part by the interaction of Io's atmosphere with plasma torus electrons and possibly also by processes analogous to terrestrial aurora associated with electric currents linking Io to Jupiter's ionosphere. The emission is highly variable, and a careful study will be necessary to distinguish the different possible sources of excitation. We have a tentative indication that the System III dependence of the emission is not consistent with an interaction between Io and the plasma torus as the dominant source of the emission. A larger set of reduced data will be presented and their implications discussed. This work was carried out with support from NASA grant NAGW-3319 and NASA contracts NAS 5-30131 and NASW-4804.

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